



November 27, 1995

Mr. Michael W. Young  
 Assistant Hazardous Materials Specialist  
 Sites Management Section  
 Vermont Department of  
 Environmental Conservation  
 103 South Main Street  
 Waterbury, Vermont 05676

RE: Summary Report and SMAC Request, Northboro Market, North Thetford (Site #95-1778)

Dear Mr. Young:

Lincoln Applied Geology, Inc. (LAG) is pleased to submit this Summary Report and Site Management Activity Complete (SMAC) Request for the Northboro Market (NM) located on Route 5 in North Thetford, Vermont. In response to the submittal of the August 1, 1995 Expressway Summary Report and your subsequent request for another monitoring well, monitoring well MW-4 was drilled and installed by Adams Engineering (AE) on September 7, 1995. In addition, LAG visited the site on September 7 and October 25, 1995 to conduct ground water level and photoionization detector (PID) headspace monitoring of the four on-site ground water monitor wells and the shallow dug well, and the collection of ground water samples (October 25<sup>th</sup>) from them for BTEX and MTBE analysis via EPA Method 8020.

Results from this second data set confirm that the ground water system beneath and downgradient of the site from the four monitor wells and shallow dug well has not been impacted by BTEX and MTBE gasoline related contamination from the former pump island, delivery piping, underground storage tanks (USTs), and associated activities at the site. There is no evidence of gasoline related vapor impacts to surrounding residences. Therefore, we are requesting that the NM site be granted a SMAC designation.

Enclosed for your information and use in reviewing this report and recommendations are the following tables, figures, and appendices:

<b>Table 1,</b>	Ground Water Elevation/Product Level;
<b>Table 2,</b>	Headspace PID Assays;
<b>Table 3,</b>	Ground Water Quality Results;
<b>Figure 1,</b>	Detailed Site Map;
<b>Figure 2,</b>	Ground Water contour Map for October 25, 1995;

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**Appendix A,** LAG Detailed Well Log of MW-4;  
**Appendix B,** Adams Engineering Well Log of MW-4; and  
**Appendix C,** October 25, 1995 Ground Water Quality Laboratory Reports.

The NM, monitoring wells, shallow dug well, former pump island, and former gasoline USTs are shown on the Detailed Site Map presented as **Figure 1**. A new ground water monitoring well (MW-4) was installed on September 7, 1995 a short distance southeast and downgradient of the former pump island as shown on **Figure 1**. The boring was advanced by Adams Engineering (AE) using vibratory coring techniques that allows the extraction of 5 foot long undisturbed cores of sediment for detailed logging purposes. A PVC well was then vibrated into place and properly developed. The LAG Detailed Well Log for well MW-4 is included as **Appendix A**, and the AE well log for MW-4 is included as **Appendix B**. Soil types encountered in MW-4 include fill materials to a depth of 1.5 feet, native silt and fine sand to 15.6 feet, and native medium to coarse sand to the bottom of the boring at 25 feet. No evidence of vapor phase, adsorbed phase, or dissolved phase gasoline-related contamination was detected by PID or olfactory senses.

Historical ground water level data from the four monitor wells and dug well are presented in **Table 1**. The nearby Connecticut River stage level greatly influences ground water levels at the site and surrounding area. Ground water level data in **Table 1** shows an overall three to four inch water level decline since July 1995 with the exception of MW-3 (located on the north side of the NM building) which increased 3.37 feet between September 7<sup>th</sup> and October 25<sup>th</sup>. This water level increase is likely due to part of the NM building being recently reoccupied as a four person residence (rear of the building) with the subsequent discharge of residential wastewater to the on-site septic system located directly adjacent to MW-3. The residence was being renovated and was unoccupied on September 7<sup>th</sup> and during previous monitoring rounds, however by October 25<sup>th</sup> it had already been occupied for a couple of days. Ground water level data from October 25<sup>th</sup> was used to develop the ground water contour map presented as **Figure 2**. The ground water mound at MW-3 that is caused by the septic system is clearly evident. The mound promotes some limited (local) radial flow, but the overall ground water flow direction is still to the east-southeast at a low gradient away from the former UST and pump island. The combined results of water level monitoring conducted since July 1995 indicate that the MW-1, 2, 3, and 4 and the dug well monitoring network is appropriately placed to determine contaminant impacts associated with the former UST and pump island.

Historical headspace PID data from the four monitor wells and dug well is



Lincoln Applied Geology, Inc.  
Environmental Consultants

RD # 1 Box 710 • Bristol, Vermont 05443 • (802) 453-4384 • FAX (802) 453-5399

presented in **Table 2**. Although very low levels of volatile organic compounds (VOCs) were detected by PID in MW-1 and MW-3 during July 1995, only background (BG) levels were detected in the four monitor wells and dug well on October 25, 1995. There are minimal to no vapor phase VOC impacts to the wells, and no detectable vapor phase impacts to the NM basement as assayed by PID.

Ground water samples were collected from the five on-site wells on October 25, 1995. The historical water quality data is summarized in **Table 3** and the laboratory reports are included as **Appendix C**. Review of the October 25<sup>th</sup> data indicates that no dissolved BTEX and MTBE compounds were detected in the ground water on-site. This data substantiates the earlier July 24, 1995 water quality results which were also nondetect for BTEX and MTBE.

Since no detectable levels of BTEX and MTBE are present in the ground water of any of the on-site wells, we request that the NM site be granted a SMAC designation. With reference to the "SMAC Classification Procedure" dated December 13, 1993, the following SMAC conditions have been met:

1. The source, nature, and extent of the gasoline-related soils contamination has been adequately defined and is of very limited extent in the vadose zone beneath the former pump island.
2. The former USTs, piping, and pump island have been properly removed. The limited vadose zone soils contamination detected beneath the pump island does not pose a threat to the ground water, nearby business, or residences.
3. No BTEX and MTBE contaminants have been detected in the ground water on-site during two complete ground water quality sampling events in July and October 1995.
4. Ground water enforcement standards have never been exceeded in any of the monitoring wells and the unused shallow dug well on-site.
5. There is no threat to human health or the environment at the site due to contaminants related to the former USTs, piping, and pump island.

Although you had requested in your August 21, 1995 letter that an additional round of ground water samples be collected during the Spring 1996 high ground water recharge period, we believe that sufficient monitoring data and ground water quality

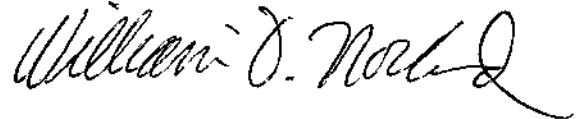


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data has been collected to grant the NM site SMAC designation.

If you have any questions or comments, please contact me or Alan Moore, P.E.,  
at (802) 453-4384.

Sincerely,



William D. Norland  
Hydrogeologist

WDN/smk  
enclosures  
cc: William Sellinger  
Peter and Lonnie Van Tyle



Project: Northboro Market  
 Location: North Thetford, Vermont

Table 1  
 VDEC Site # 95-1778  
 Sheet 1 of 1

**Ground Water Elevation/Product Level (feet)**

Data Point	TOC	07/10/95	07/24/95	09/07/95	10/25/95		
MW-1	100.00	81.75	82.00	81.55	81.33		
MW-2	97.93	81.74	82.01	81.52	81.31		
MW-3	98.18	81.72	82.01	81.56	84.93		
MW-4	101.19				81.69		
Dug Well	95.07	81.55	81.99	81.42	81.22		

Notes:

- 1 - Elevation datum assumed
- 2 - Reference elevation is elevation of top of PVC well casing
- Light Grey Cell = DRY
- Dark Grey Cell = Inaccessible

Project: Northboro Market  
Location: North Thetford, Vermont

Table 2  
VDEC Site # 95-1778  
Sheet 1 of 1

**Photoionization Results (PID - ppm)**

Data Point	07/10/95	07/25/95	09/07/95	10/25/95			
MW-1	1.4	0.6	0.8	BG			
MW-2	BG	BG	0.2	BG			
MW-3	0.4	0.2	BG	BG			
MW-4				BG			
Dug Well	BG	BG	BG	BG			

Notes:  
BG - Background  
SL - Saturated Lamp

Project: Northboro Market  
 Location: North Thetford, Vermont

Table 3  
 VDEC Site # 95-1778  
 Sheet 1 of 1

**Ground Water Quality Results (ppb)**

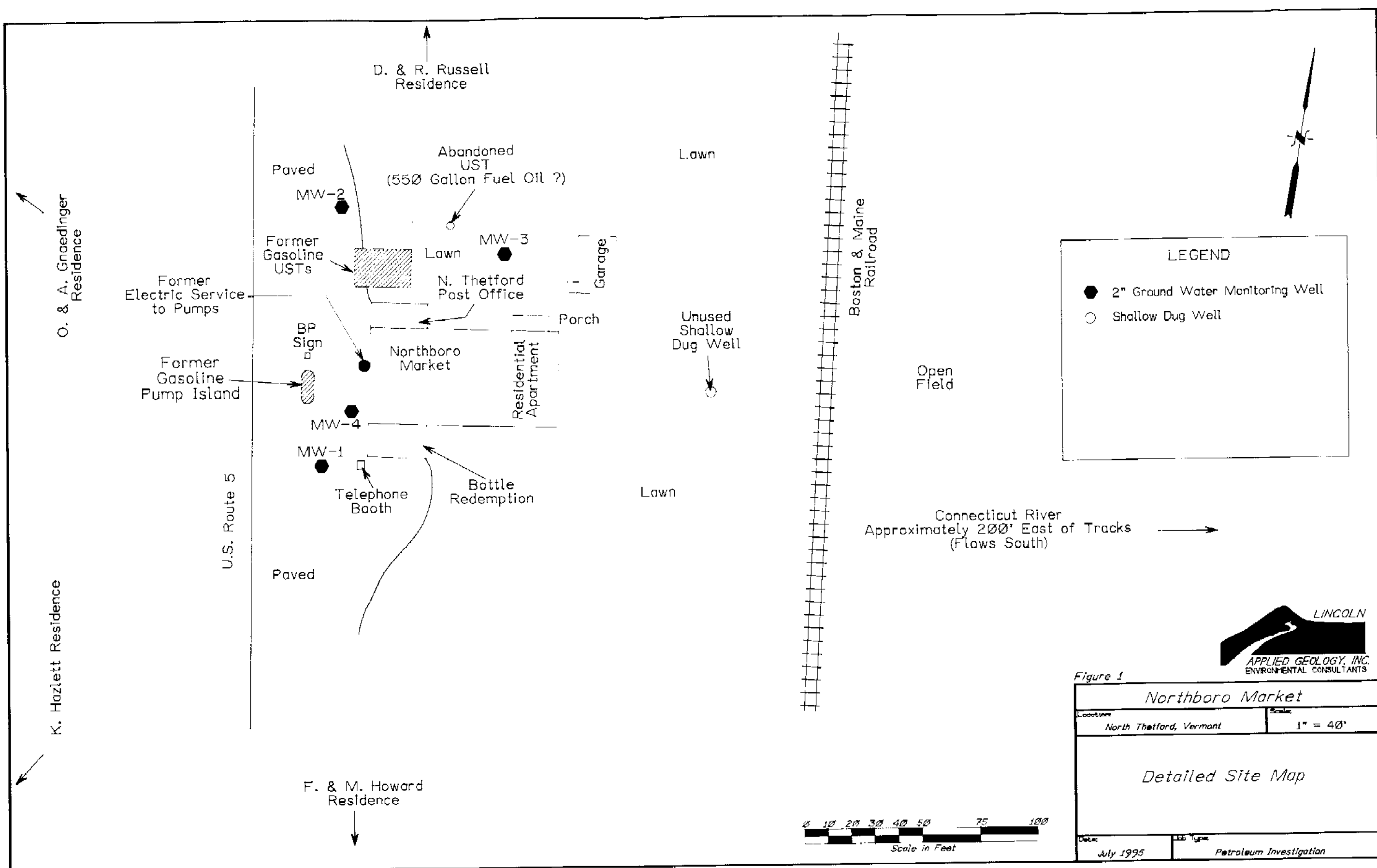
Data Point	07/24/95	10/25/95					
MW-1	<6	<5	<6	<5			
MW-2	<6	<5	<6	<5			
MW-3	<6	<5	<6	<5			
MW-4			<6	<5			
Dug Well	<6	<5	<6	<5			
Trip Blank	<6	<5	<6	<5			

**NOTES:**

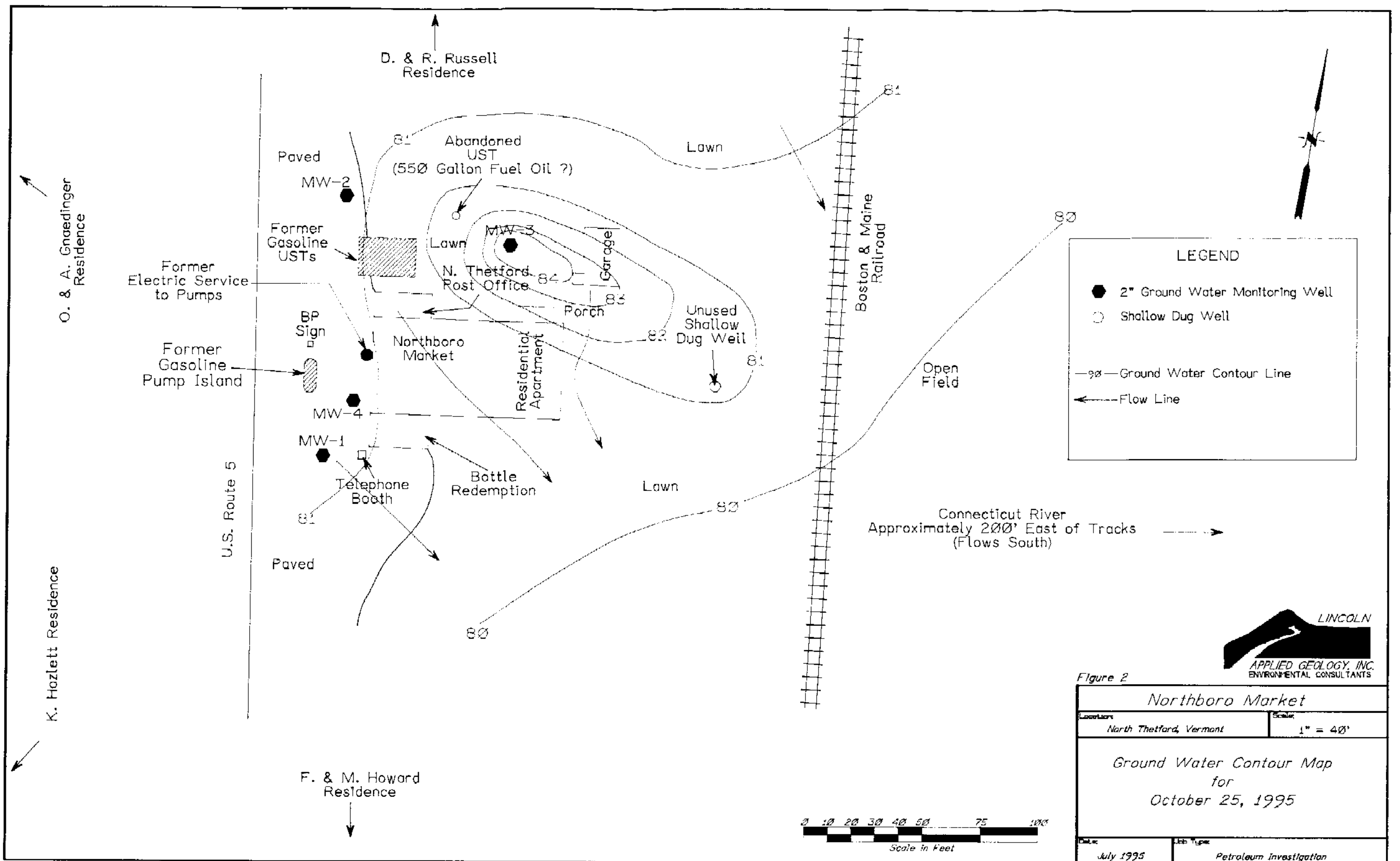
MTBE in upper right corner of cell

BTEX in lower left corner of cell

< - Contaminant not detected at specified detection limit







## Appendix A

### LAG Detailed Well Log for MW-4

## WELL LOG

WELL: MW-4  
 LOCATION: Northboro Market, Route 5, Thetford, Vermont - Southeast of former pump island  
 DRILLER: Adams Engineering, Underhill, Vermont  
 HYDROGEOLOGIST: William Norland, Lincoln Applied Geology, Inc.  
 DATE: September 7, 1995

**Soils Description:** (BG = Background [0.4], SL = Saturated Lamp [>500], ppm = Parts Per Million)

<u>Depth</u>	<u>Description</u>	<u>PID (ppm)</u>
0 - 3.8'	Solid probe used to open hole.	
	<u>Sample 0 - 5.0', Recovery = 3.1'</u>	
0 - 0.25'	Dry, black, <u>asphalt pavement</u> .	BG
0.25' - 1.5'	Dry, light brown, fine to medium sand; some fine to coarse gravel. <u>Fill</u> , trace charcoal at bottom.	BG
1.5' - 1.7'	Dry, tan, <u>silt</u> ; little very fine sand.	BG
1.7' - 3.1'	Dry, tan, <u>fine sand</u> ; little medium to coarse sand; trace silt.	BG
	<u>Sample 5.0' - 10.0', Recovery = 5.0'</u>	
5.0' - 6.2'	Dry, tan with rust mottles, <u>fine sand</u> ; little medium to coarse sand; trace silt.	BG
6.2' - 8.8'	Dry, olive tan with minor brown mottles, <u>silt</u> ; little very fine sand. Laminations present.	BG
8.8' - 9.7'	Dry, olive tan, <u>silt</u> ; some very fine sand.	BG
9.7' - 10.0'	Dry, brown, <u>silt</u> ; trace very fine sand.	BG
	<u>Sample 10' - 15.0', Recovery = 5.0'</u>	
10.0' - 14.5'	Dry, moist below 11.5', olive tan, <u>silt</u> ; some very fine sand. Mottled rust brown with laminations 1/16" thick.	BG
14.5' - 14.7'	Moist, tan, <u>medium to coarse sand</u> .	BG
14.7' - 15.0'	Moist, olive tan with brown mottles, <u>silt</u> ; some fine to very fine sand.	BG
	<u>Sample 15.0' - 20.0', Recovery = 3.5'</u>	
15.0' - 15.6'	Moist, olive tan with brown mottles, <u>silt</u> ; some fine to very fine sand.	BG
15.6' - 18.5'	Moist, tan, <u>coarse sand</u> ; some medium sand; trace fine sand. Very coarse grained.	BG
	<u>Sample 20.0' - 20.3', Recovery = 3.8'</u>	
20.0' - 20.3'	Wet, tan, <u>coarse sand</u> ; some medium sand; trace fine sand, coarse gravel.	BG

## WELL LOG

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20.3' - 20.4'	Wet, olive grey, <u>silt</u> ; some very fine sand. Laminated.	BG
20.4' - 23.3'	Wet, tan to grey, <u>coarse sand</u> ; some medium sand; trace fine sand.	BG

No gasoline-related contamination detected by PID or olfactory sense. Well installed, vibrated into place.

### Well Construction:

Bottom of Boring:	25'
Bottom of Well:	25'
Well Screen:	15' (9' - 24'); 0.010" slot; 2" PVC; sch. 40
Solid Riser:	8.7' (0.3' - 9'); 2" PVC, sch. 40
Sand Pack:	12.8' (6.7' - 19.5')
Bentonite Seal:	5.7' (1' - 6.7')
Backfill:	None
Well Box:	One cemented flush with grade.

## Appendix B

### Adams Engineering Well Log for MW-4

ADAMS ENGINEERING  
Gerard Adams  
RD #1, Box #3700, Underhill, VT 05489

September 7, 1995

Mr. Bill Norland

Lincoln Applied Geology

Well Logs: Northboro Market/ N. Thetford

Manway cemented in place; sampled with polyethylene (PE) lined 5' X 2.375" ID NQ sampler vibrated to depth, pulled & sample vibrated from casing in PE liner for examination; well with slip cap to create annulus & sandpack vibrated to depth in backfilled borehole left by sampler; bentonite slurry placed in open hole. Wells developed with peristaltic pump using dedicated PE suction hose, clean slow recovery.

9/5/95 MW #2

SOILS WELL

G. Manway.

0 > -5.0' Black top // (over) fine sand// black top//brown fine sand.

-.3' Top well 2" solid riser.

-1' Top bentonite slurry.

-6.8' Bottom bentonite, top sand pack placed in open borehole.

-14.0' Top well screen, 3-5' X 2" X .010" slot screens.

-5.0.10.0' Brown fine sand.

-10.0 > 15.0' Same//coarse sand.

-15.0 > 20.0' Coarse sand becoming saturated, collapsed -19'.

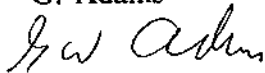
-19' Bottom sand top native collapsed soils.'

-20 > 25.0' Saturated coarse sand.

-24.0' Bottom of well screen, PVC point

\* Well vibrated into place with EW rods inside well, possible traces of toluene may result from decon water trapped inside rods.

G. Adams



APPLIED GEOLOGY

## Appendix C

October 25, 1995  
Ground Water Laboratory Reports

NUWD 10/10/00  
typed AB**Green Mountain Laboratories, Inc.**RR#3, Box 5210  
Montpelier, Vermont 05602

Phone: (802) 223-1468

Fax: (802) 223-8888

**LABORATORY RESULTS**

CLIENT NAME:	Lincoln Applied Geology	REF #:	264
ADDRESS:	RD1 Box 710 Bristol, Vermont 05443	PROJECT NO.:	not given
SAMPLE LOCATION:	Northboro Market	DATE OF SAMPLE:	10/25/95
SAMPLER:	Jim Holman	DATE OF RECEIPT:	10/25/95
		DATE OF ANALYSIS:	10/31/95-11/1/95
ATTENTION:	Bill Norland	DATE OF REPORT:	11/6/95

Pertaining to the analyses of specimens submitted under the accompanying chain of custody form, please note the following:

- Water samples submitted for VOC analysis were preserved with HCl. The trip blank was prepared by the client from reagent water supplied by the laboratory.
- Specimens were processed and examined according to the procedures outlined in the specified method.
- Holding times were honored.
- Instruments were appropriately tuned and calibrations were checked with the frequencies required in the specified method.
- Blank contamination was not observed at levels interfering with the analytical results.
- Continuing calibration standards were monitored at intervals indicated in the specified method. The resulting analytical precision and accuracy were determined to be within method QA/QC acceptance limits.
- The efficiency of analyte recovery for individual samples was monitored by the addition of surrogate analytes to all samples, standards, and blanks. Surrogate recoveries were found to be within laboratory QA/QC acceptance limits, unless noted otherwise.

Reviewed by:

Director, Chemical Services



# Green Mountain Laboratories, Inc.

RD#1, Box 5210  
Montpelier, Vermont 05602

Phone (802) 223-1468

Fax (802) 223-8888

## LABORATORY RESULTS

GC/MS METHOD - BTEX (BENZENE, TOLUENE, ETHYLBENZENE, XYLENES) + MTBE

CLIENT NAME:	Lincoln Applied Geology	PROJECT CODE:	not given
PROJECT NAME:	Northboro Market	GML REF.#:	264
REPORT DATE:	11/6/95	STATION:	MW-1
DATE SAMPLED:	10/25/95	TIME SAMPLED:	not given
DATE RECEIVED:	10/25/95	SAMPLER:	Jim Holman
ANALYSIS DATE:	10/31/95	SAMPLE TYPE:	Water

PARAMETER	PQL (µg/L)	Conc. (µg/L)
Benzene	1	ND
Toluene	1	ND
Ethylbenzene	1	ND
Xylenes	3	ND
MTBE	5	ND

Surrogate % Recovery: 80.3%

ND = Not Detected.

# Green Mountain Laboratories, Inc.

RD#1, Box 5210  
Montpelier, Vermont 05602

Phone (802) 223-1468

Fax (802) 223-8688

## LABORATORY RESULTS

GC/MS METHOD - BTEX (BENZENE, TOLUENE, ETHYLBENZENE, XYLENES) + MTBE

CLIENT NAME:	Lincoln Applied Geology	PROJECT CODE:	not given
PROJECT NAME:	Northboro Market	GML REF.#:	264
REPORT DATE:	11/6/95	STATION:	MW-2
DATE SAMPLED:	10/25/95	TIME SAMPLED:	not given
DATE RECEIVED:	10/25/95	SAMPLER:	Jim Holman
ANALYSIS DATE:	10/31/95	SAMPLE TYPE:	Water

PARAMETER	PQL (µg/L)	Conc. (µg/L)
Benzene	1	ND
Toluene	1	ND
Ethylbenzene	1	ND
Xylenes	3	ND
MTBE	5	ND

Surrogate % Recovery: 83.0%

ND = Not Detected.

# Green Mountain Laboratories, Inc.

RD#1, Box 5210  
Montpelier, Vermont 05602

Phone (802) 223-1468

Fax (802) 223-8688

## LABORATORY RESULTS

GC/MS METHOD - BTEX (BENZENE, TOLUENE, ETHYLBENZENE, XYLENES) + MTBE

CLIENT NAME:	Lincoln Applied Geology	PROJECT CODE:	not given
PROJECT NAME:	Northboro Market	GML REF.#:	264
REPORT DATE:	11/6/95	STATION:	MW-3
DATE SAMPLED:	10/25/95	TIME SAMPLED:	not given
DATE RECEIVED:	10/25/95	SAMPLER:	Jim Holman
ANALYSIS DATE:	11/1/95	SAMPLE TYPE:	Water

PARAMETER	PQL (µg/L)	Conc. (µg/L)
Benzene	1	ND
Toluene	1	ND
Ethylbenzene	1	ND
Xylenes	3	ND
MTBE	5	ND

Surrogate % Recovery: 83.1%

ND = Not Detected.

# Green Mountain Laboratories, Inc.

RD#1, Box 5210  
Montpelier, Vermont 05602

Phone (802) 223-1488

Fax (802) 223-8888

## LABORATORY RESULTS

GC/MS METHOD - BTEX (BENZENE, TOLUENE, ETHYLBENZENE, XYLENES) + MTBE

CLIENT NAME:	Lincoln Applied Geology	PROJECT CODE:	not given
PROJECT NAME:	Northboro Market	GML REF.#:	264
REPORT DATE:	11/6/95	STATION:	MW-4
DATE SAMPLED:	10/25/95	TIME SAMPLED:	not given
DATE RECEIVED:	10/25/95	SAMPLER:	Jim Holman
ANALYSIS DATE:	11/1/95	SAMPLE TYPE:	Water

PARAMETER	PQL (µg/L)	Conc. (µg/L)
Benzene	1	ND
Toluene	1	ND
Ethylbenzene	1	ND
Xylenes	3	ND
MTBE	5	ND

Surrogate % Recovery: 82.1%

ND = Not Detected.

# Green Mountain Laboratories, Inc.

RD#1, Box 5210  
Montpelier, Vermont 05602

Phone (802) 223-1468

Fax (802) 223-8688

## LABORATORY RESULTS

GC/MS METHOD - BTEX (BENZENE, TOLUENE, ETHYLBENZENE, XYLENES) + MTBE

CLIENT NAME:	Lincoln Applied Geology	PROJECT CODE:	not given
PROJECT NAME:	Northboro Market	GML REF.#:	264
REPORT DATE:	11/6/95	STATION:	Dug Well
DATE SAMPLED:	10/25/95	TIME SAMPLED:	not given
DATE RECEIVED:	10/25/95	SAMPLER:	Jim Holman
ANALYSIS DATE:	10/31/95	SAMPLE TYPE:	Water

PARAMETER	PQL (µg/L)	Conc. (µg/L)
Benzene	1	ND
Toluene	1	ND
Ethylbenzene	1	ND
Xylenes	3	ND
MTBE	5	ND

Surrogate % Recovery: 83.3%

ND = Not Detected.

# Green Mountain Laboratories, Inc.

RD#1, Box 5210  
Montpelier, Vermont 05602

Phone (802) 223-1468

Fax (802) 223-8688

## LABORATORY RESULTS

GC/MS METHOD - BTEX (BENZENE, TOLUENE, ETHYLBENZENE, XYLENES) + MTBE

CLIENT NAME:	Lincoln Applied Geology	PROJECT CODE:	not given
PROJECT NAME:	Northboro Market	GML REF.#:	264
REPORT DATE:	11/6/95	STATION:	Trip
DATE SAMPLED:	10/25/95	TIME SAMPLED:	not given
DATE RECEIVED:	10/25/95	SAMPLER:	Jim Holman
ANALYSIS DATE:	10/31/95	SAMPLE TYPE:	Water

PARAMETER	PQL (µg/L)	Conc. (µg/L)
Benzene	1	ND
Toluene	1	ND
Ethylbenzene	1	ND
Xylenes	3	ND
MTBE	5	ND

Surrogate % Recovery: 82.8%

ND = Not Detected.

